PATENT

IN THE U.S. PATENT AND TRADEMARK OFFICE

Appellants:	Claus Erdmann FURST et al.
Application No.:	**09/964,893**
Art Unit:	2615
Filed:	September 28, 2001
Examiner:	Xu Mei
For:	MICROPHONE UNIT WITH INTERNAL A/D CONVERTER
Atty. Dkt. No.:	45900-000664/US
Conf. No.:	1329

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September 11, 2008

APPELLANTS' REPLY BRIEF UNDER 37 C.F.R. §41.41

Sir:

Further to Appellants' Appeal Brief filed on April 28, 2008 and in response to the Examiner's Answer mailed on July 11, 2008, Appellants submit herewith a Reply Brief pursuant to 37 C.F.R. § 41.41

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I. STATUS OF CLAIMS

Claims 1, 5, 7, 17, 18, 36 and 38 are pending in the current application with claim 1 being written in independent form. Claims 6, 8-14, 26-34 and 37 have been withdrawn. Claims 2-4, 15, 16, 19-25 and 35 have been cancelled.

Appellants are appealing the rejection to claims 1, 5, 7, 17, 18, 36, each of which has been twice rejected.

II. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Appellants requests the Board's review of the rejection of claims 1, 5, 7, 17, 18, 36 and 38 under 35 U.S.C. § 103(a) as being unpatentable over Martin, U.S. Patent No. 5,796,848 in view of Arndt et al., U.S. Patent No. 6,421,448.

III. ARGUMENTS

A. 35 U.S.C. §103(a) REJECTION – MARTIN AND ARNDT

Appellants submit that claims 1, 5, 7, 17, 18, 36 and 38 are allowable for features present in each claim. Appellants submit that the claims are argued in one group, which includes claims 1, 5, 7, 17, 18, 36 and 38, which rise and fall together, with claim 1 being representative.

i. GROUP I: CLAIMS 1, 5, 7, 17, 18, 36 AND 38

In view of the following arguments, Appellants submit that Martin in view of Arndt, as relied upon by the Examiner, fails to teach, or suggest, a microphone assembly including a "filter means in the signal path between the pre-amplifier and the sigma-delta modulator, the filter means preventing low frequency components from reaching the sigma-delta modulator" as recited in independent claim 1.

a. Function of Arndt's High-Pass Filter

The Examiner states that "[i]n this case, the secondary reference of Arndt clearly discloses 'having high pass filter subsequent to microphone contain a coupling capacitor and a resistor is **a customary circuit** for coupling a microphone signal into an amplifier circuit of a hearing device' (Col. 4, lines 35-40 of Arndt, and as stated in the rejection above). And it is well recognized in the audio or electronic art that an ordinary or customary high pass filter (30 or 30' as shown by Arndt) is generally used to suppress or filter out low frequency signal that is usually considered as noise or disturbance signal." Examiner's Answer, pp. 5-6.

However, Appellants submit that Arndt fails to suggest that the high-pass filters 30 and 30' are used to "suppress or filter out" low frequency signals. Arndt teaches that,

> A hearing aid device having two omnidirectional input transducers, referred to in the following also as microphones, is known from European Application 848 573. A series-connected microphone, coupling capacitor and resistor are, respectively, located in two separate signal paths which are interconnected with one another to produce a directional microphone characteristic. In addition, one of the two signal paths has a signal delay unit. A disadvantage of this known circuit is that the desired directional characteristic can be attained only if the two microphones deviate at the most only negligibly from one another with regard to their signal transmission behavior. In the output signal of the two microphones, a phase difference of more than 3° in the frequency range in which the directivity is to be attained already acts negatively on the desired directional characteristic of the arrangement. Only microphones having almost the same signal transmission behavior thus can be used in the known circuit. Since, however, larger manufacturing tolerances cannot be avoided in the manufacture of the microphones, two microphones matching one another, i.e. exhibiting the same signal transmission behavior, must be selected from a larger number of similar microphones. This process is time-consuming and costly."
>
> Arndt, col. 1, l. 18-40.

Thus, in conventional hearing aids having two microphones, Arndt teaches that the desired directional characteristic can only be attained if the phase of the signals from each microphone deviates from the other microphone by less than 3° in the frequency range.

Arndt further teaches that,

> The above object is achieved in accordance with the principles of the present invention in a method for producing a hearing aid with a directional microphone characteristic, and a hearing aid produced according to the method, wherein at least two omnidirectional microphones are used to receive incoming acoustic signals and wherein each microphone has a signal path connected therewith for processing the signals received by that microphone, the signal paths subsequently being combined to form an overall output signal which is supplied to an output transducer, **and wherein each signal path has a high-pass filter therein, with the respective limit frequencies for the high-pass filters being set to match the respective limit frequencies of the microphone in the other signal path.** In a hearing aid having two such signal paths, for example, the limit frequency of the high-pass filter in a first of the signal paths is matched to the limit frequency of the omnidirectional microphone which is connected in the second of the two signal paths, and the limit frequency of the high-pass filter in the second of the frequency paths is matched to the limit frequency of the omnidirectional microphone in the first of the signal paths.
>
> Arndt, col. 1, l. 53 – col. 2, l. 15 (emphasis added).

Therefore, Arndt motivates one of ordinary skill in the art to use high pass filters to adjust or "match" respective limit frequencies of the two microphones in order to achieve the desired directional characteristic, not to prevent or block low frequency components entering into the high-pass filters.

Furthermore, the Examiner states "[i]t is clear to one of ordinary skill in that art that such ordinary or customary high pass filter would have provided inherent benefit of attenuating or suppressing or preventing the low frequency noise or interference signal being applied into the high pass filter." Examiner's Answer, pp. 5-6.

However, as discussed on pages 10-11 of Appellants' Appeal Brief, Arndt teaches that the small hole in the membrane of the microphone suppresses lower frequency interference signals, not the high-pass filters 30 and 30'. That is, the lower frequency interference signals traveling through the microphone circuit are suppressed by the small hole in the membrane prior to reaching the high-pass filters 30 and 30'.

Therefore assuming *arguendo* that the high-pass filters 30 and 30' were low frequency filters (which Appellants do not agree with), Appellants submit that the lower frequency signals would not reach the filters due to the small hole in the membrane of each microphone. Thus, Appellants maintain that the high-pass filters 30 and '30 in Arndt do not inherently prevent "low frequency components from reaching the sigma-delta modulator" as claimed in independent claim 1.

As such, Appellants maintain that Arndt fails to teach, or suggest, "the filter means preventing low frequency components from reaching the sigma-delta modulator" as recited in independent claim 1.

b. Position of Arndt's High-Pass Filters

The Examiner states "[i]n this case, the primary reference of Martin discloses a single microphone housing 6 that including pre-amplifier 8 and sigma-delta modulator 7 (see Fig. 2). It would have been obvious to one of ordinary skill in that art that the improved microphone assembly by the combinations of Martin and Arndt would have included the customary high pass filter within the single microphone housing as shown in Martin; contrary to the appellants' argument." Examiner's Answer, p. 7.

However, referring to Fig. 1 of Arndt (reproduced below), Appellants note that the high pass filters 3 and 3' are located upstream of the pre-amplifying unit 4.

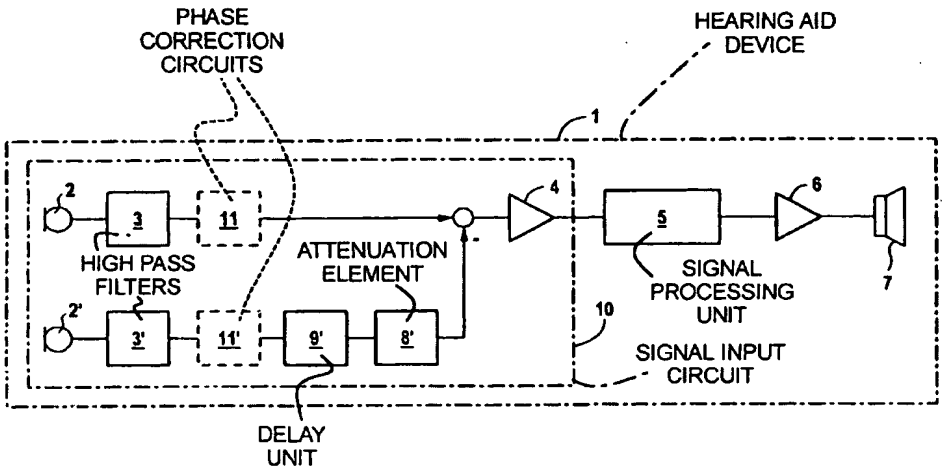

FIG. 1 OF ARNDT

Likewise, referring to Fig. 2 of Arndt (reproduced below), Appellants note that the high pass filters 30 and 30' are also located upstream of the operational amplifiers OP1' and OP2.

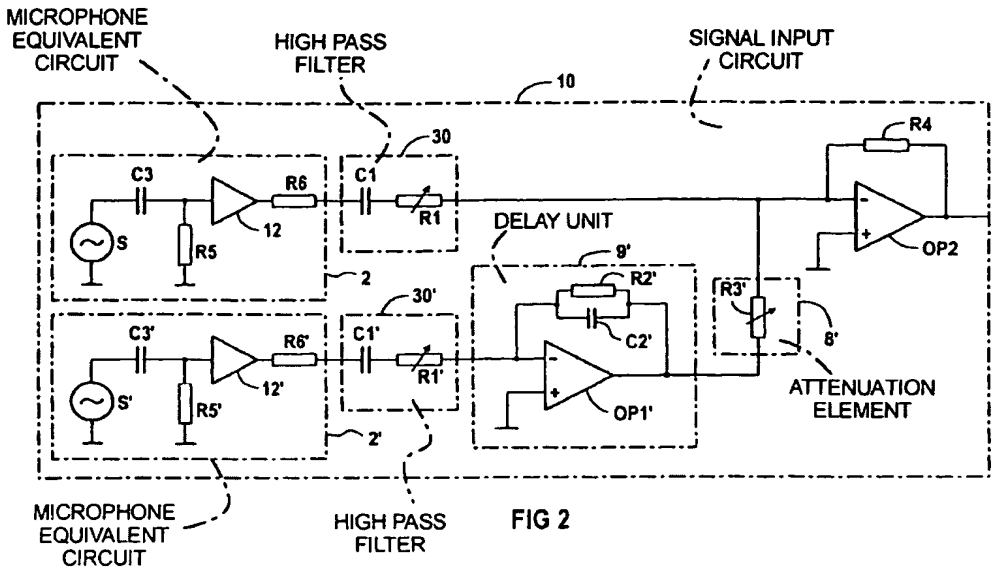

FIG. 2 OF ARNDT

Thus, Appellants submit that Arndt fails to motivate one of ordinary skill in the art to provide a high-pass filter, as taught by Arndt, between the preamplifier 8 and the A/D converter 7of Martin.

Furthermore, Martin and Arndt fail to address the reason (namely, to avoid DC or very low frequency components from causing spurious tonal components in the sigma-delta modulator) taught by example embodiments for introducing the filter means between a pre-amplifier and sigma-delta modulator, as recited in independent claim 1.

Even assuming *arguendo* that the high pass filters 30 and 30' taught by Arndt prevented low frequency components introduced by the microphone from reaching the sigma-delta modulator later in the signal path (which Appellants do not admit), Appellants submit that there is no motivation to specifically place the filters between the pre-amplifier and the sigma-delta modulator. Rather, one of ordinary skill in the art would place the filters in the position taught by Arndt (*i.e.*, before amplifier circuits OP1', OP2 wherein the filters do not prevent low frequency components in the form of DC components and very low

frequency components introduced by the amplifier circuits OP1', OP2 from reaching the sigma-delta modulator.

Therefore, because the spurious tone generation problem is not address in Arndt and Martin, Appellants submit that there is no motivation to provide a filter having the same position as the filter means recited in independent claim 1.

For at least the reasons discussed above, Appellants submit that Arndt fails to cure the deficiencies of Martin with respect to independent claim 1.

VIII. CONCLUSION

Appellants respectfully request that the Board reverse the Examiner's obviousness rejection of claims 1, 5, 7, 17, 18, 36 and 38 in view of Martin and Arndt.

The Commissioner is authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

HARNESS, DICKEY, & PIERCE, P.L.C.

By:_____

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